UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,841	10/30/2003	Peter Hinterdorfer	MOL 0074 PA/40518.102	9286

7590 07/30/2004

DINSMORE & SHOHL LLP
Suite 500
One Dayton Centre
Dayton, OH 45402-2023

EXAMINER	
CYGAN, MICHAEL T	

ART UNIT	PAPER NUMBER
2855	

DATE MAILED: 07/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/697,841	HINTERDORFER ET AL.	
	Examiner	Art Unit	
	Michael Cygan	2855	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *26-33* is/are allowed.

6)☒ Claim(s) *1-10,13-25 and 34* is/are rejected.

7)☒ Claim(s) *11 and 12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6 Feb 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: In the "Brief Description of the Drawings", Figures 1 and 2 should be referred to as prior art.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3, 4, 6-9, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Wong (Nature 1998). Wong discloses the claimed invention, a recognition force microscope comprising a scanning probe having a tip functionalized with a molecule, the functionalized tip being sensitive to a property of a scanned surface through a binding and/or adhesion interaction; see Figures 1 and 3. The probe is adapted to oscillate at a low mechanical Q-factor; see caption of Figure 2. The microscope includes a means for recording probe displacement over time such that both the topographic and

spatial locations of interactions are measured and recorded; a Nanoscope III electronic control system interprets "tapping mode" cantilever vertical swing amplitudes and provides topographic and interaction spatial images as shown in Figure 2 and the caption. Figures 1 and 3 portray system used for detecting specific (amine-substrate functional) and specific antibody (biotin-streptavidin) binding events during scanning. Figure 3 shows the biotin attached to the nanotube-functionalized tip through a flexible linkage. See entire document.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 5, 15, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (Nature 1998). Wong teaches the claimed invention except for the claimed Q factor range. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the claimed range, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, see In re Aller 105 USPQ 233. The advantage of a sharper control signal would be gained thereby.

4. Claims 2, 13-19, 22-25, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (Nature 1998) in view of Doris (US 5,383,354). Wong teaches the claimed invention except for optical detection as claimed and the measurement of tip oscillation amplitude for tip height feedback. Doris teaches AFM tapping mode operation using a laser beam/photodetector with electronic control in combination with tapping mode operation, which is taught to consist of measurement of the amplitude (both upwards & downwards) of a cantilever oscillating at its fundamental frequency, determination of damping of the amplitude, and control of tip height to maintain a desired tip amplitude; see column 1 lines 13-25 and 42-54. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the laser beam/photodetector with electronic

control in combination with measurement of the amplitude as taught by Doris in the invention taught by Wong to perform tapping mode operation, since Doris teaches such techniques as standard in the art for AFM tapping mode operation. Note that Wong discloses AFM tapping mode operation as the method for obtaining the results of Figure 2. Note that measurement of amplitude damping responsive to tip-surface interaction is the same as measurement of cantilever average deflection when measured at the ca. 30 kHz cantilever vibrational frequencies and ca. 1 Hz scanning frequencies of Wong.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (Nature 1998) in view of Han (App. Phys. Lett. 1995). Wong teaches the claimed invention except for magnetic excitation. Han teaches magnetic excitation for tapping mode AFM; see page 4111. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use magnetic excitation as taught by Han in the invention taught by Wong to excite the AFM, since Han teaches that this leads to higher resolution.

Allowable Subject Matter

6. Claims 26-33 are allowed.

7. Claims 11 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
8. The following is a statement of reasons for the indication of allowable subject matter: the prior art neither discloses nor fairly teaches measurement and utilization of the downward displacement for probe height control simultaneous with upward displacement for interaction measurement, or the calculation of upward or downward displacement values from average values as set forth specifically in the claims.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Simultaneous topographic and interaction mapping through AFM is disclosed by Overney (Langmuir 1994 v10 p1281), Noy (JACS 1995 v117 p7943), Abendan (Langmuir 2002 v18 p4847), Yazdani (Nature 1999 v401 p227), McKendry (Nature 1998 v391 p566), and Sinniah (JACS 1996 v118 p8925). Tapping force AFM is disclosed by Elings (US 6,008,489)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cygan whose telephone number is (571) 272-2175. The examiner can normally be reached on 8:30-6 M-Th, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MICHAEL CYGAN, PH.D.
PRIMARY EXAMINER